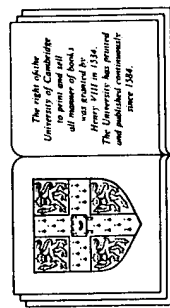

A DICTIONARY OF GENETIC ENGINEERING

STEPHEN G. OLIVER

*Department of Biochemistry and Applied Molecular Biology
University of Manchester Institute of Science and Technology*

JOHN M. WARD

Department of Biochemistry, University College, London



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screening See screen. Also a technique for mutant enrichment. E.g. in penicillin screening the mutagenised culture is placed under conditions in which wild-type, but not mutant, bacteria will grow. This culture is then treated with the antibiotic penicillin, which kills the growing (wild-type) cells but has no effect on the non-growing (mutant) cells. The population of viable bacteria is thus enriched for mutant cells.

S-D sequence See ribosome-binding site.

secrete To transfer a protein molecule through a membrane. Proteins may be secreted into (i) an intracellular compartment, e.g. a vacuole or mitochondrion, (ii) the periplasmic space, or (iii) the culture medium. Secretion out of the cell and into the culture medium is often described as excretion.

selection The establishment of a set of culture conditions under which organisms with a desired genotype will grow in preference to those with other genotypes. The geneticist must design appropriate culture conditions so that only organisms of the desired type can grow at all. (See positive selection)

self-ligation The joining of the two ends of a restriction fragment to each other using DNA ligase. The reaction is carried out at low DNA concentrations to reduce the likelihood of two molecules being ligated together. The procedure is often used in sub-cloning.

sense strand The strand of duplex DNA which is transcribed into a complementary mRNA (or other functional RNA) molecule.

	sense strand	
DNA	5' TACTTCGCAATCACCGCGGGGATA	3'
	3' ATGAAGCGTTTAGTGGCGGCCCTAT	5'
	anti-sense strand	
RNA	5' AUGAAAGCGUUUAGUGGCGGCCCUAU	3'

sequencing The determination of the order of nucleotides in a DNA or RNA molecule or that of amino acids in a polypeptide chain. (For DNA sequencing, see Sanger method, Maxam-Gilbert method)

sequencing gel A long polyacrylamide slab gel which has sufficient resolving power to separate single-stranded fragments of DNA or RNA which differ in length by only a single nucleotide. Electrophoresis is carried out at high voltage and with the gel in a vertical position. Urea is usually included in the gel mixture as a denaturing agent. This prevents internal base pairing within the single-stranded molecules and ensures that their relative speed of migration is solely dependent on their length. Such gels are used to separate the radioactively

labelled products of, for example, the Maxam-Gilbert or the Sanger sequencing reactions.

sex-factor A plasmid which promotes its own transfer via bacterial conjugation.

shear To fragment DNA molecules into smaller pieces. DNA, as a very long and fairly stiff molecule, is very susceptible to hydrodynamic shear forces. Forcing a DNA solution through a hypodermic needle will fragment it into smaller pieces. The size of the fragments obtained is inversely proportional to the diameter of the needle's bore. The actual sites at which the shear force breaks a DNA molecule are approximately random. Therefore DNA fragments may be generated by random shear and then cloned (by either tailing their ends or using linkers) so as to create a complete gene library of an organism. This method is little used now, having been replaced by the use of partial digests with four base pair cutters, e.g. *Sau* 3A as a means of generating random DNA fragments.

Shine-Dalgarno sequence, SD sequence See ribosome-binding site.

shot-gun A shot-gun experiment is one in which random fragments of an entire genome are cloned into a vector. A particular gene may then be selected for, or a gene bank established which is subsequently screened for sequences of interest. The word is also used as a verb, e.g. 'We shot-gunned *Xenopus* DNA into pBR322'.

shuttle vector, bifunctional vector A vector molecule which is able to replicate in two different host organisms and can therefore be used to 'shuttle' genes from one to the other. E.g. the YEp, pJDB219, is a shuttle vector able to replicate in *E. coli* from its pMB9 origin and in *S. cerevisiae* from its 2 μ plasmid origin.

signal peptide See signal sequence.

signal sequence, signal peptide A short, 15-30 amino acid, segment at the N-terminus of a secreted or exported protein. This signal sequence is recognised by some part of the cell's protein-processing machinery and the protein is then secreted through the membrane of the cell or one of its organelles. The signal sequence is usually removed at some point in the secretion process by a specific protease and is therefore not present in the mature protein.

simian virus 40 A papovavirus which normally infects monkey (simian) cells. Like bacteriophage λ it is able either to establish a lytic infection or it may integrate into the host chromosome. In the latter case it transforms the cell into a tumourous state. SV40 has a small, circular